

What is claimed is:

1. A multi-band helical antenna comprising:

a dielectric body including a plurality of dielectric
5 sheets stacked in a predetermined order; and

at least a first metallic pattern section and a second
metallic pattern section provided in the dielectric body,
the first metallic pattern including a plurality of first
partially opened metallic loop patterns and a plurality of
10 first connection elements connecting the respective adjacent
first partially opened metallic loop patterns to form a
first spiral structure, and the second metallic pattern
section including a plurality of second partially opened
metallic loop patterns and a plurality of second connection
15 elements connecting the respective adjacent second partially
opened metallic loop patterns to form a second spiral
structure, the first and the second metallic pattern
sections having different entire lengths.

20 2. A multi-band helical antenna comprising:

a dielectric body including at least a plurality of
first dielectric sheets of a first thickness t_1 and a
plurality of second dielectric sheets of a second thickness
 t_2 that is different from t_1 , the dielectric sheets being
25 stacked in a predetermined order; and

at least a first metallic pattern section and a second

metallic pattern section provided in the first dielectric sheets and the second dielectric sheets, respectively, the first metallic pattern section including a plurality of first partially opened metallic loop patterns spaced apart
5 from each other by a first distance and a plurality of first connection elements connecting the respective adjacent first metallic loop patterns to form a first spiral structure, and the second metallic pattern section including a plurality of second partially opened metallic loop patterns spaced apart
10 from each other by a second distance different from the first distance and a plurality of second connection elements connecting the respective adjacent second metallic loop patterns to form a second spiral structure.

15 3. A multi-band helical antenna comprising:

a dielectric body including a plurality of dielectric sheets of a predetermined thickness, the dielectric sheets being stacked in a predetermined order; and

at least a first metallic pattern section and a second
20 metallic pattern section provided in the dielectric body, the first metallic pattern section including a plurality of first partially opened metallic loop patterns having a first radius r_1 and a plurality of first connection elements connecting the respective adjacent first partially opened
25 metallic loop patterns to form a first spiral structure, and the second metallic pattern section including a plurality of

second partially opened metallic loop patterns having a second radius r_2 that is different from r_1 and a plurality of second connection elements connecting the respective adjacent second partially opened metallic loop patterns to form a second spiral structure.

4. A multi-band helical antenna comprising:
a dielectric body including a plurality of dielectric sheets of a predetermined thickness, the dielectric sheets being stacked in a predetermined order;
at least a first metallic pattern section and a second metallic pattern section provided in the dielectric body, the first metallic pattern section including a plurality of first partially opened metallic loop patterns having a first entire length l_1 and a plurality of first connection elements connecting the respective adjacent first partially opened metallic loop patterns to form a first spiral structure, and the second metallic pattern section including a plurality of second partially opened metallic loop patterns having a second entire length l_2 different from l_1 and a plurality of second connection elements connecting the respective adjacent second partially opened metallic loop patterns to form a second spiral structure.

5. The antenna of any one of claims 1 to 4, wherein the dielectric body has a rectangular parallelepiped shape.

6. The antenna of any one of claims 1 to 4, wherein each of the dielectric sheets has a via hole and the connection element is provided by filling a conductive material same as
5 that of the metallic loop patterns in the via hole.

7. The antenna of any one of claims 1 to 4, wherein an adhesive layer is provided between the adjacent dielectric sheets.

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8. The antenna of claim 7, wherein a barrier is provided on the dielectric sheet around each of the connection elements to prevent the adhesive from contacting the connection elements.

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9. The antenna of claim 4, wherein the first and the second metallic loop patterns are alternately disposed in a vertical direction.

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